Intel® Pentium® II Processor

FLOTHERM* Thermal Model

2.0

The Pentium® II processor may contain design defects or errors known as errata which may cause the product to deviate from the published specifications. Current characterized errata are available on request.

Table of Contents

Introduction

The Pentium® II processor is the next processor in the family of Intel Architecture microprocessors. The Pentium II processor extends the power of the Pentium® Pro processor, adds the capabilities of MMX™ media enhancement technology and incorporates the new Single Edge Contact (S.E.C.) cartridge packaging technology.

To address many of the challenges in the development of cooling systems for the Pentium II processor, Intel® and Flomerics* have developed a compact FLOTHERM* thermal model of the Pentium II processor. Technical support for FLOTHERM thermal modeling using the Pentium II processor FLOTHERM thermal model is available directly from Flomerics, the developers of FLOTHERM.

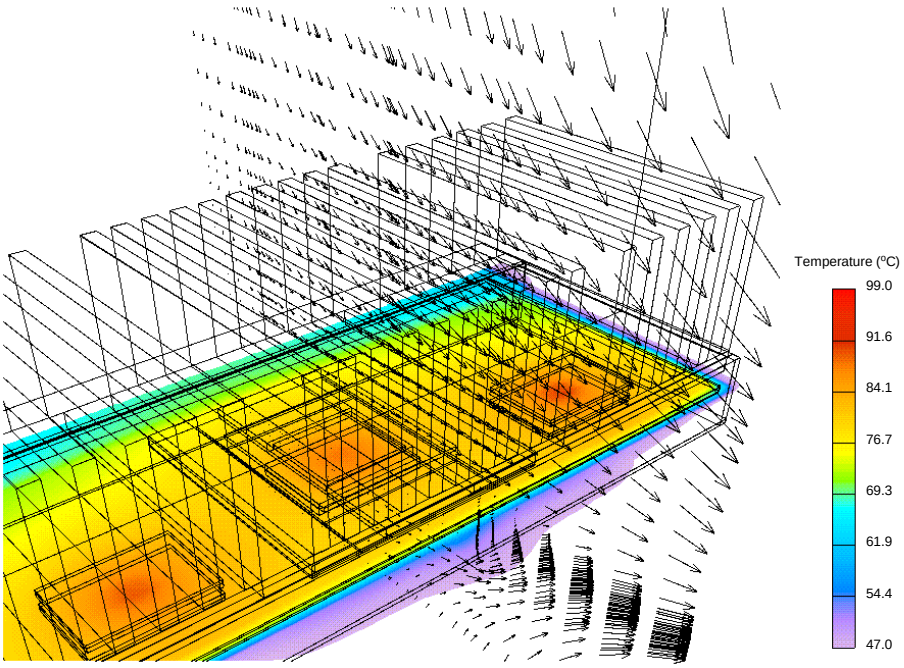


Figure 1 - Results from a FLOTHERM Simulation using the Pentium® II Processor Thermal Model*

Technical Background

Few engineers in the computer industry will question the importance of sound thermal design. In the past much of the work was done in the labs using prototype or pre-production hardware. Today, dramatically reduced development cycle times and increasingly tight specifications now require that this work be done as far forward in the design cycle as possible.

FLOTHERM is a CFD tool from Flomerics which enables designers to create computational models of designs and carry out numerical “experiments” before committing to hardware or creating prototypes. Widely used in the electronics industry, the FLOTHERM software is well validated and its accuracy has been proven in numerous real-life applications. More details can be found by contacting Flomerics.

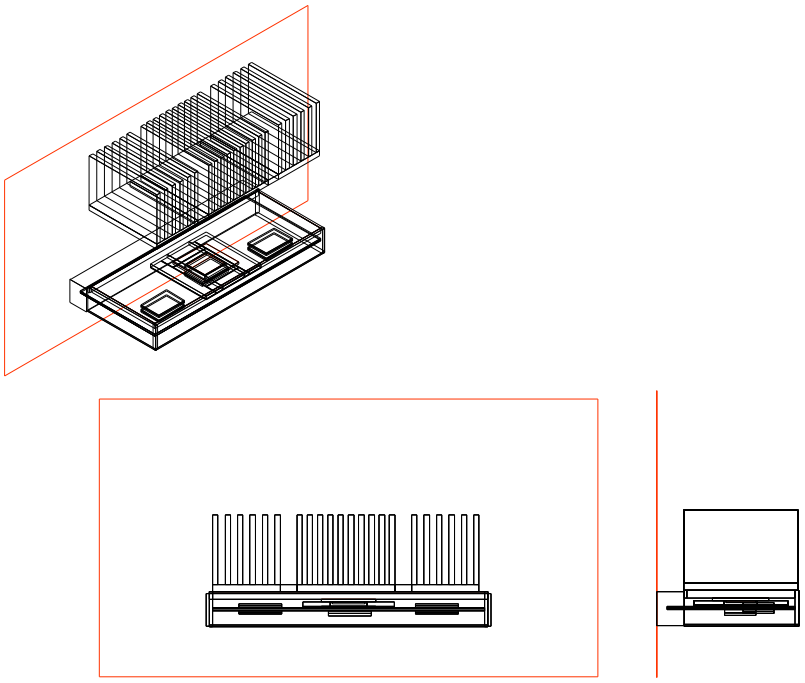


Figure 2 - Detailed FLOTHERM Model of the Pentium® II Processor with a Typical Heatsink

In the past, system designers had to create thermal models of processors for themselves. To reduce design time, Intel and Flomerics have embarked on an initiative to make things simpler by creating thermal models for direct delivery to system designers.

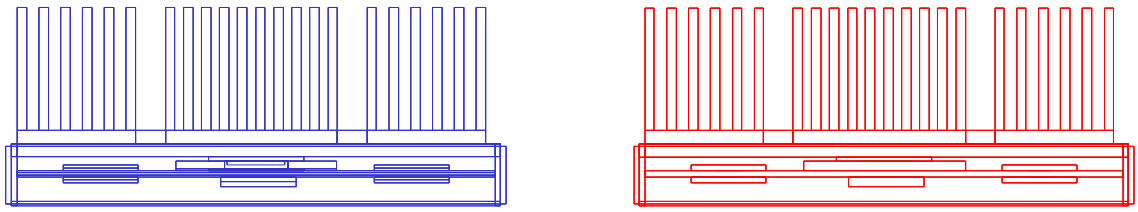


Figure 3 - Comparison of Detailed and Compact FLOTHERM Models of the Pentium® II Processor

One of the original objections to the use of this technology has been the complexity of the models. It is difficult, if not impossible, to represent all of the small scale details of a processor whilst doing complete system analysis. However, recent advances in modeling by Flomerics now mean that all the important factors affecting the thermal behavior of the component can be encapsulated in a “compact” model. This model has significantly lower complexity than a full model of the processor but still yields accurate answers. The compact model of the Pentium II processor has been validated against both a detailed model and experimental results for accuracy.

The FLOTHERM models of heatsinks available for use with the Pentium II processor are available from a number of heatsink vendors. Contact Flomerics for details on heatsink model availability.

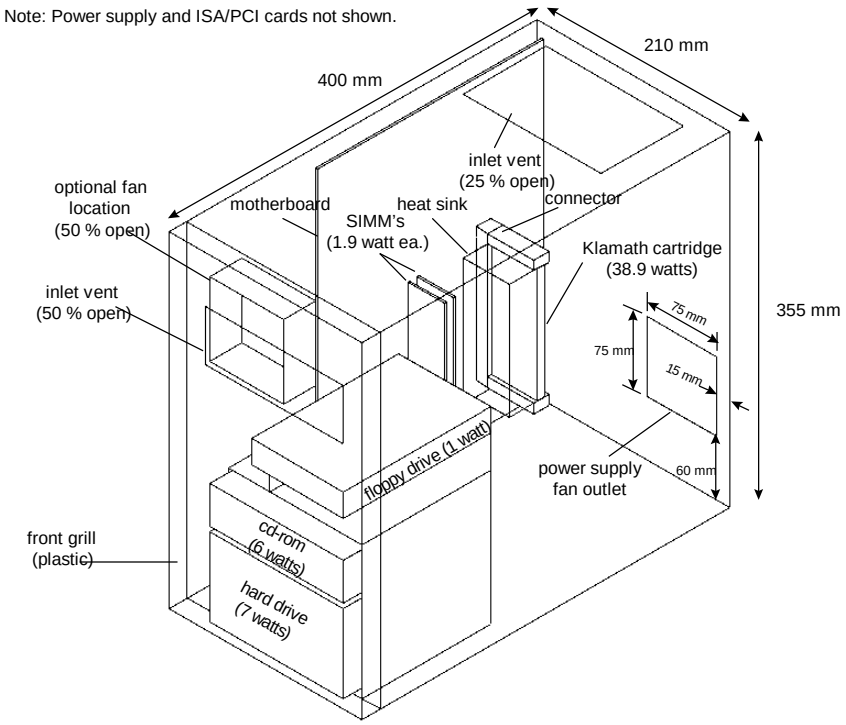


Figure 4a - Representative Pentium® II Processor ATX Form Factor Chassis

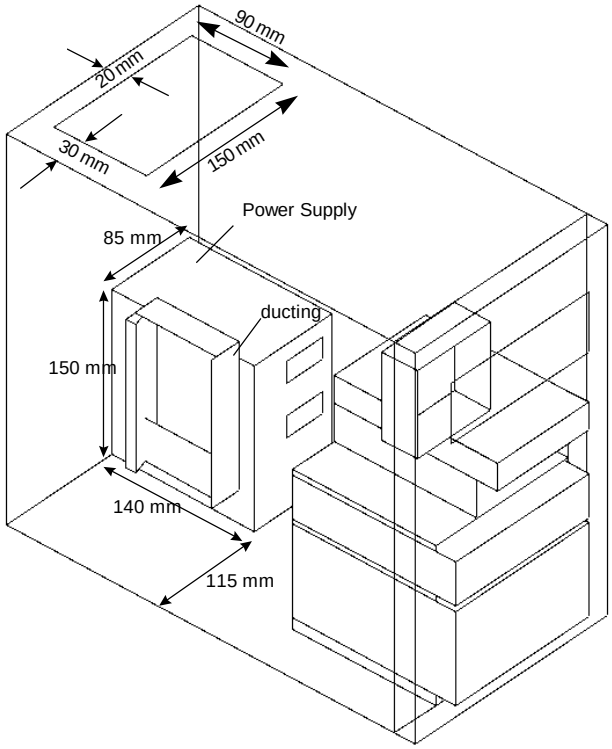


Figure 4b - Representative Pentium® II Processor ATX Form Factor Chassis

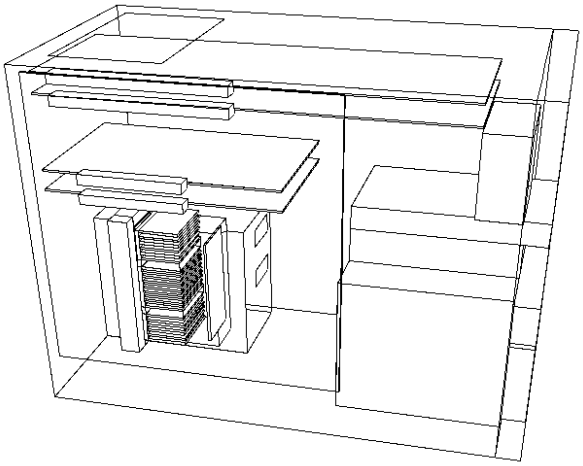
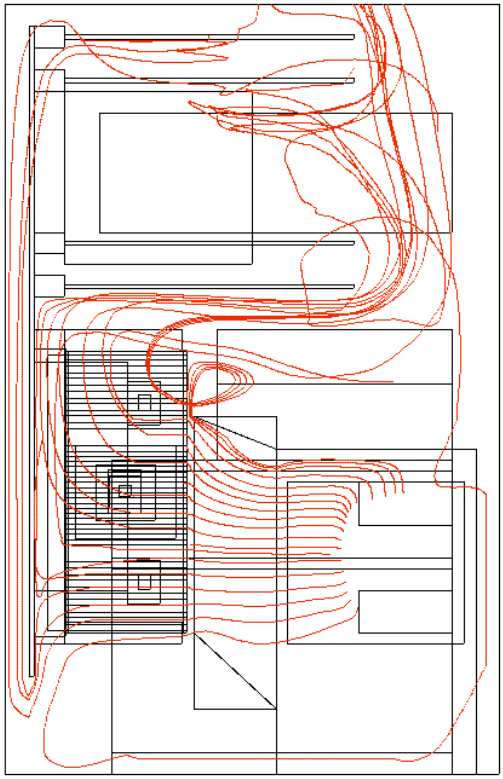


Fig 5a.



5b.

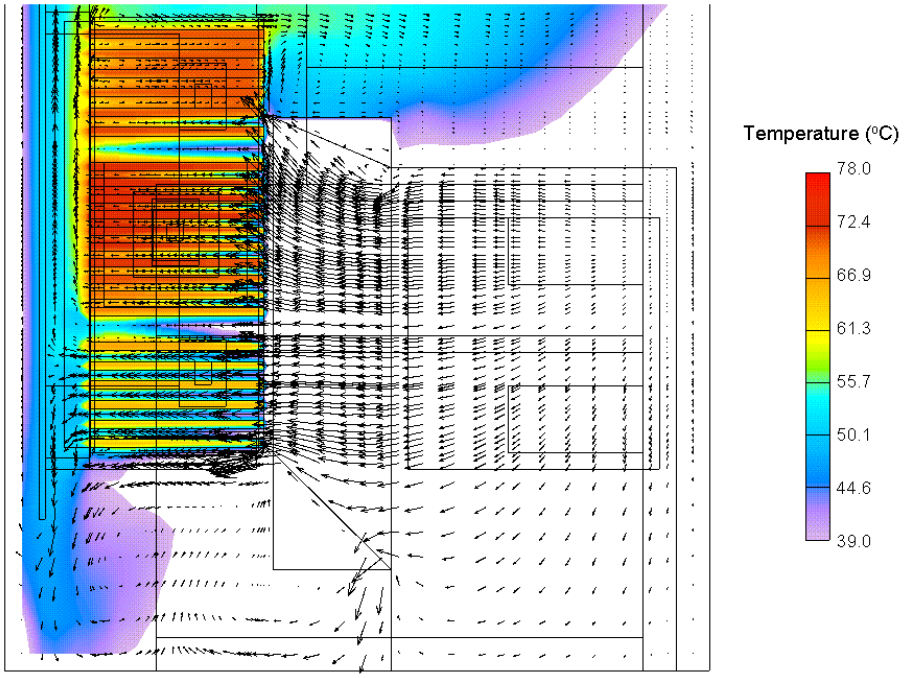


Fig. 5c.

Figure 5 - Results for the Pentium® II Processor in a Representative ATX Form Factor Chassis
a) General View of the Geometry (motherboard transparent for clarity
b) Streamlines for flow passing through the processor heatsink
c) Temperatures and flows in the vicinity of the processor heatsink

Delivery and Support Arrangements

Obtaining the Pentium II Processor Thermal Model

The Pentium II processor FLOTHERM thermal model is available at the Intel Developer Internet Site, *http://developer.intel.com*.

Technical Support

Technical support on the use of the FLOTHERM software package, the Pentium II processor FLOTHERM model and in interpreting results is available directly from Flomerics and authorized distributors. Contact details are as follows:

<table>
<tr><td colspan="3">FLOMERICS</td></tr>
<tr><td colspan="3">UK And Regions Not Covered By A Local Office:

Flomerics Ltd.
81 Bridge Road
Hampton Court
Surrey KT8 9HH
United Kingdom

Tel: +44 (0) 181 941 8810
Fax: +44 (0) 181 941 8730
support@flomerics.co.uk</td></tr>
<tr><td>North America (Eastern)

Flomerics Inc.
2 Mount Royal Avenue
Marlborough MA 01752
USA

Tel: +1 508 460 0112
Fax: +1 508 624 0559
support@flomerics.com</td><td>North America (Western)

Flomerics Inc.
2880 Zanker Road
Suite 203
San Jose CA 95134
USA

Tel: +1 408 954 7332
Fax: +1 408 954 7335
support@ca.flomerics.com</td><td>Japan

K2 Corporation
Motoazabu A-Bldg 7F
3-12-1 Motoazabu
Minato-Ku
Tokyo 106 Japan

Tel: +81 3 3408 2590
Fax: +81 3 3408 2591
k2mail@dp.u-netsurf.or.jp</td></tr>
<tr><td>France

Flomerics Limited
32 Rue Jean Rostand
91893 Orsay
France

Tel: +33 1 69 35 30 90
Fax: +33 1 69 41 27 67
100733.2755@compuserve.com</td><td>Germany

Flomerics Limited
Raiffeisenstrasse 16
D 70794 Filderstadt
Germany

Tel: +49 (0)711 77915-0
Fax: +49 (0)711 77915-15
100073.407@compuserve.com</td><td>Korea

Shin Han Trade Co
928 Wunchun-dong
Hungduk-gu
Cheongju 361-110
South Korea

Tel: +82 (0) 431 271-6303
Fax: +82 (0) 431 271-6304</td></tr>
<tr><td>South Africa

Anchor Devices (Pty) Ltd
590 Swart Street
Moreletta Park
Pretoria 0044
South Africa

Tel: +27 12 420 2924
Fax: +27 12 342 1379</td><td>Israel

Advanced Logistics
Development(ALD)
PO Box 679
Rishon Lezion
75106 Israel

Tel: +972 3 967 8804
Fax: +972 3 966 7495</td><td>Taiwan

Flotrend Corporation
Room 705 #6
Chang Chun Road
Taipei
Taiwan

Tel: 02 581 9806
Fax: 02 581 9750</td></tr>
<tr><td colspan="3">http://www.flomerics.com</td></tr>
</table>